

**WHAT IS CLAIMED IS:**

1. An apparatus comprising:  
a plurality of network ports;  
a central processing unit (CPU) interface; and  
5 a controller to

send, to the CPU interface, a request to approve an association between one of  
the network ports and a source media access control (MAC) address of a packet  
received on the one of the network ports when no request to approve the association  
between the one of the network ports and the source MAC address has been sent to  
10 the CPU interface, and

send, to the CPU interface, the request to approve the association between the  
one of the network ports and the source MAC address when an approval for an  
association between the source MAC address and a different one of the network ports  
has been received from the CPU interface.

15 2. The apparatus of claim 1, wherein the controller is further to determine  
whether an association exists between any of the network ports and the source MAC address.

3. The apparatus of claim 2, further comprising:  
20 a memory to store a forwarding database; and  
wherein to determine whether an association exists between any of the network ports  
and the source MAC address, the controller is further to search a forwarding database for the  
source MAC address.

25 4. The apparatus of claim 1, wherein the controller is further to determine  
whether no request to approve the association between the one of the network ports and the  
source MAC address has been sent to the CPU interface.

30 5. The apparatus of claim 4, wherein, to determine whether no request to  
approve the association between the one of the network ports and the source MAC address

has been sent to the CPU interface, the controller is further to determine whether an unapproved association between the one of the network ports and the source MAC address exists.

5           6.       The apparatus of claim 5, wherein, to determine whether the unapproved association between the one of the network ports and the source MAC address exists, the controller is further:

              to determine whether the association between the one of the network ports and the source MAC address exists; and

10           when the association between the one of the network ports and the source MAC address exists, to determine whether the association between the one of the network ports and the source MAC address is approved.

              7.       The apparatus of claim 6, further comprising:

15           a memory to store a forwarding database; and

              wherein, to determine whether the association between the one of the network ports and the source MAC address exists, the controller is further to search the forwarding database for an entry comprising the source MAC address.

20           8.       The apparatus of claim 7, wherein, to determine whether the association between the one of the network ports and the source MAC address is approved, the controller is further to determine whether an approval flag is set for the entry comprising the source MAC address.

25           9.       The apparatus of claim 1, wherein the controller is further to create an unapproved association between the one of the network ports and the source MAC address.

              10.      The apparatus of claim 9, wherein, to create the unapproved association between the one of the network ports and the source MAC address, the controller is further:

30           to create the association between the one of the network ports and the source MAC address; and

to mark the association between the one of the network ports and the source MAC address as unapproved.

11. The apparatus of claim 10, further comprising:  
5 a memory to store a forwarding database; and  
wherein, to create the association between the one of the network ports and the source MAC address comprises, the controller is further to create an entry in the forwarding database, the entry identifying the one of the network ports and the source MAC address.

10 12. The apparatus of claim 11, wherein, to mark the association between the one of the network ports and the source MAC address as unapproved, the controller is further to set an approval flag in the forwarding database for the entry.

13. The apparatus of claim 12, wherein the controller is further:  
15 to receive, from the CPU interface, in response to the request to approve the association between the one of the network ports and the source MAC address, an approval of the association between the one of the network ports and the source MAC address; and  
to clear the approval flag for the entry.

20 14. The apparatus of claim 12, wherein the controller is further:  
to receive, from the CPU interface, in response to the request to approve the association between the one of the network ports and the source MAC address, a disapproval of the association between the one of the network ports and the source MAC address; and  
to delete the entry.

25 15. The apparatus of claim 9, wherein the controller is further:  
to receive, from the CPU interface, in response to the request to approve the association between the one of the network ports and the source MAC address, an approval of the association between the one of the network ports and the source MAC address; and  
30 to approve the unapproved association between the one of the network ports and the source MAC address.

16. The apparatus of claim 9, wherein the controller is further:

to receiving, from the CPU interface, in response to the request to approve the association between the one of the network ports and the source MAC address, a disapproval  
5 of the association between the one of the network ports and the source MAC address; and  
to delete the unapproved association between the one of the network ports and the source MAC address.

17. The apparatus of claim 1, wherein the packet further comprises a destination  
10 MAC address, wherein the controller is further:

to process the packet according to the destination MAC address when an association between the destination MAC address and a further one of the network ports exists and the association between the destination MAC address and the further one of the network ports has been approved; and

15 to process the packet without regard to the destination MAC address when no association between the destination MAC address and any of the network ports exists; and

to process the packet without regard to the destination MAC address when the association between the destination MAC address and the further one of the network ports exists but the association between the destination MAC address and the further one of the  
20 network ports has not been approved.

18. The apparatus of claim 17, wherein, to process the packet according to the destination MAC address, the controller is further to cause the further one of the network ports to transmit the packet.

19. The apparatus of claim 17, wherein to process the packet without regard to the destination MAC address, the controller is further to cause all of the network ports but the one of the network ports to transmit the packet.

20. An integrated circuit comprising the apparatus of claim 1.

21. A network switch comprising the apparatus of claim 1.

22. The network switch of claim 21, wherein the network switch is an Ethernet network switch.

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23. The network switch of claim 21, further comprising:  
a CPU in communication with the CPU interface.

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24. An apparatus comprising:  
a plurality of network port means;

central processing unit (CPU) interface means; and  
controller means for

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sending, to the CPU interface means, a request to approve an association  
between one of the network port means and a source media access control (MAC)  
address of a packet received on the one of the network port means when no request to  
approve the association between the one of the network port means and the source  
MAC address has been sent to the CPU interface means, and

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sending, to the CPU interface means, the request to approve the association  
between the one of the network port means and the source MAC address when an  
approval for an association between the source MAC address and a different one of  
the network port means has been received from the CPU interface means.

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25. The apparatus of claim 24, wherein the controller means is further for  
determining whether an association exists between any of the network port means and the  
source MAC address.

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26. The apparatus of claim 25, further comprising:  
memory means for storing a forwarding database; and  
wherein, for determining whether an association exists between any of the network  
port means and the source MAC address, the controller means is further for searching a  
forwarding database for the source MAC address.

27. The apparatus of claim 24, wherein the controller means is further for determining whether no request to approve the association between the one of the network port means and the source MAC address has been sent to the CPU interface means.

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28. The apparatus of claim 27, wherein, for determining whether no request to approve the association between the one of the network port means and the source MAC address has been sent to the CPU interface means, the controller means is further for determining whether an unapproved association between the one of the network port means and the source MAC address exists.

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29. The apparatus of claim 28, wherein, for determining whether the unapproved association between the one of the network port means and the source MAC address exists, the controller means is further for:

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determining whether the association between the one of the network port means and the source MAC address exists; and

when the association between the one of the network port means and the source MAC address exists, determining whether the association between the one of the network port means and the source MAC address is approved.

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30. The apparatus of claim 29, further comprising:  
memory means for storing a forwarding database; and  
wherein, for determining whether the association between the one of the network port means and the source MAC address exists, the controller means is further for searching the forwarding database for an entry comprising the source MAC address.

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31. The apparatus of claim 30, wherein, for determining whether the association between the one of the network port means and the source MAC address is approved, the controller means is further for determining whether an approval flag is set for the entry comprising the source MAC address.

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32. The apparatus of claim 24, wherein the controller means is further for creating an unapproved association between the one of the network port and the source MAC address.

33. The apparatus of claim 32, wherein, for creating the unapproved association  
5 between the one of the network port means and the source MAC address, the controller means is further for:

creating the association between the one of the network port means and the source MAC address; and

10 marking the association between the one of the network port means and the source MAC address as unapproved.

34. The apparatus of claim 33, further comprising:  
memory means for storing a forwarding database; and  
wherein, for creating the association between the one of the network port means and  
15 the source MAC address comprises, the controller means is further for creating an entry in the forwarding database, the entry identifying the one of the network port means and the source MAC address.

35. The apparatus of claim 34, wherein, for marking the association between the  
20 one of the network port means and the source MAC address as unapproved, the controller means is further for setting an approval flag in the forwarding database for the entry.

36. The apparatus of claim 35, wherein the controller means is further for:  
receiving, from the CPU interface means, in response to the request to approve the  
25 association between the one of the network port means and the source MAC address, an approval of the association between the one of the network port means and the source MAC address; and

clearing the approval flag for the entry.

30 37. The apparatus of claim 35, wherein the controller means is further for:

receiving, from the CPU interface means, in response to the request to approve the association between the one of the network port means and the source MAC address, a disapproval of the association between the one of the network port means and the source MAC address; and

5 deleting the entry.

38. The apparatus of claim 32, wherein the controller means is further for:

receiving, from the CPU interface means, in response to the request to approve the association between the one of the network port means and the source MAC address, an  
10 approval of the association between the one of the network port means and the source MAC address; and

approving the unapproved association between the one of the network port means and the source MAC address.

39. The apparatus of claim 32, wherein the controller means is further for:

receiving, from the CPU interface, in response to the request to approve the association between the one of the network port means and the source MAC address, a disapproval of the association between the one of the network port means and the source  
15 MAC address; and

20 deleting the unapproved association between the one of the network port means and the source MAC address.

40. The apparatus of claim 24, wherein the packet further comprises a destination MAC address, wherein the controller means is further for:

25 processing the packet according to the destination MAC address when an association between the destination MAC address and a further one of the network port means exists and the association between the destination MAC address and the further one of the network port means has been approved; and

30 processing the packet without regard to the destination MAC address when no association between the destination MAC address and any of the network port means exists; and



processing the packet without regard to the destination MAC address when the association between the destination MAC address and the further one of the network port means exists but the association between the destination MAC address and the further one of the network port means has not been approved.

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41. The apparatus of claim 40, wherein, for processing the packet according to the destination MAC address, the controller means is further for causing the further one of the network port means to transmit the packet.

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42. The apparatus of claim 40, wherein, for processing the packet without regard to the destination MAC address, the controller means is further for causing all of the network port means but the one of the network port means to transmit the packet.

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43. An integrated circuit comprising the apparatus of claim 24.

44. A network switch comprising the apparatus of claim 24.

45. The network switch of claim 44, wherein the network switch is an Ethernet network switch.

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46. The network switch of claim 44, further comprising:  
CPU means in communication with the CPU interface means.

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47. A method for a switch comprising a plurality of network ports and a central processing unit (CPU) interface:

receiving, on one of the network ports, a packet comprising a source media access control (MAC) address;

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sending, to the CPU interface, a request to approve an association between the one of the network ports and the source MAC address when no request to approve the association between the one of the network ports and the source MAC address has been sent to the CPU interface; and

sending, to the CPU interface, the request to approve the association between the one of the network ports and the source MAC address when an association between the source MAC address and a different one of the network ports has been approved.

5           48.    The method of claim 47, further comprising:  
              determining whether an association exists between any of the network ports and the source MAC address.

              49.    The method of claim 48, wherein determining whether an association exists  
10   between any of the network ports and the source MAC address comprises:  
              searching a forwarding database for the source MAC address.

              50.    The method of claim 47, further comprising:  
              determining whether no request to approve the association between the one of the  
15   network ports and the source MAC address has been sent to the CPU interface.

              51.    The method of claim 50, wherein determining whether no request to approve  
the association between the one of the network ports and the source MAC address has been  
sent to the CPU interface comprises:  
20           determining whether an unapproved association between the one of the network ports  
and the source MAC address exists.

              52.    The method of claim 51, wherein determining whether the unapproved  
association between the one of the network ports and the source MAC address exists  
25   comprises:  
              determining whether the association between the one of the network ports and the  
source MAC address exists; and  
              when the association between the one of the network ports and the source MAC  
address exists, determining whether the association between the one of the network ports and  
30   the source MAC address is approved.

53. The method of claim 52, wherein determining whether the association between the one of the network ports and the source MAC address exists comprises:  
searching a forwarding database for an entry comprising the source MAC address.

5 54. The method of claim 53, wherein determining whether the association between the one of the network ports and the source MAC address is approved comprises:  
determining whether an approval flag is set for the entry comprising the source MAC address.

10 55. The method of claim 47, further comprising:  
creating an unapproved association between the one of the network ports and the source MAC address.

15 56. The method of claim 55, wherein creating the unapproved association between the one of the network ports and the source MAC address comprises:  
creating the association between the one of the network ports and the source MAC address; and  
marking the association between the one of the network ports and the source MAC address as unapproved.

20 57. The method of claim 56, wherein creating the association between the one of the network ports and the source MAC address comprises:  
creating an entry in a forwarding database, the entry identifying the one of the network ports and the source MAC address.

25 58. The method of claim 57, wherein marking the association between the one of the network ports and the source MAC address as unapproved comprises:  
setting an approval flag for the entry.

30 59. The method of claim 58, further comprising:

receiving, from the CPU interface, in response to the request to approve the association between the one of the network ports and the source MAC address, an approval of the association between the one of the network ports and the source MAC address; and clearing the approval flag for the entry.

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60. The method of claim 58, further comprising:

receiving, from the CPU interface, in response to the request to approve the association between the one of the network ports and the source MAC address, a disapproval of the association between the one of the network ports and the source MAC address; and deleting the entry.

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61. The method of claim 55, further comprising:

receiving, from the CPU interface, in response to the request to approve the association between the one of the network ports and the source MAC address, an approval of the association between the one of the network ports and the source MAC address; and approving the unapproved association between the one of the network ports and the source MAC address.

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62. The method of claim 55, further comprising:

receiving, from the CPU interface, in response to the request to approve the association between the one of the network ports and the source MAC address, a disapproval of the association between the one of the network ports and the source MAC address; and deleting the unapproved association between the one of the network ports and the source MAC address.

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63. The method of claim 47, wherein the packet further comprises a destination MAC address, further comprising:

processing the packet according to the destination MAC address when an association between the destination MAC address and a further one of the network ports exists and the association between the destination MAC address and the further one of the network ports has been approved; and

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processing the packet without regard to the destination MAC address when no association between the destination MAC address and any of the network ports exists; and

processing the packet without regard to the destination MAC address when the association between the destination MAC address and the further one of the network ports exists but the association between the destination MAC address and the further one of the network ports has not been approved.

64. The method of claim 63, wherein processing the packet according to the destination MAC address comprises:

transmitting the packet from the further one of the network ports.

65. The method of claim 63, wherein processing the packet without regard to the destination MAC address comprises:

transmitting the packet from all of the network ports but the one of the network ports.

66. A computer program embodying instructions executable by a computer for a switch comprising a plurality of network ports and a central processing unit (CPU) interface, comprising:

receiving, on one of the network ports, a packet comprising a source media access control (MAC) address;

sending, to the CPU interface, a request to approve an association between the one of the network ports and the source MAC address when no request to approve the association between the one of the network ports and the source MAC address has been sent to the CPU interface; and

sending, to the CPU interface, the request to approve the association between the one of the network ports and the source MAC address when an association between the source MAC address and a different one of the network ports has been approved.

67. The computer program of claim 66, further comprising:

determining whether an association exists between any of the network ports and the source MAC address.

68. The computer program of claim 67, wherein determining whether an association exists between any of the network ports and the source MAC address comprises: searching a forwarding database for the source MAC address.

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69. The computer program of claim 66, further comprising:  
determining whether no request to approve the association between the one of the network ports and the source MAC address has been sent to the CPU interface.

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70. The computer program of claim 69, wherein determining whether no request to approve the association between the one of the network ports and the source MAC address has been sent to the CPU interface comprises:

determining whether an unapproved association between the one of the network ports and the source MAC address exists.

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71. The computer program of claim 70, wherein determining whether the unapproved association between the one of the network ports and the source MAC address exists comprises:

determining whether the association between the one of the network ports and the source MAC address exists; and

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when the association between the one of the network ports and the source MAC address exists, determining whether the association between the one of the network ports and the source MAC address is approved.

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72. The computer program of claim 71, wherein determining whether the association between the one of the network ports and the source MAC address exists comprises:

searching a forwarding database for an entry comprising the source MAC address.

73. The computer program of claim 72, wherein determining whether the association between the one of the network ports and the source MAC address is approved comprises:

determining whether an approval flag is set for the entry comprising the source MAC address.

74. The computer program of claim 66, further comprising:  
creating an unapproved association between the one of the network ports and the source MAC address.

75. The computer program of claim 74, wherein creating the unapproved association between the one of the network ports and the source MAC address comprises:  
creating the association between the one of the network ports and the source MAC address; and

marking the association between the one of the network ports and the source MAC address as unapproved.

76. The computer program of claim 75, wherein creating the association between the one of the network ports and the source MAC address comprises:

creating an entry in a forwarding database, the entry identifying the one of the network ports and the source MAC address.

77. The computer program of claim 76, wherein marking the association between the one of the network ports and the source MAC address as unapproved comprises:

setting an approval flag for the entry.

78. The computer program of claim 77, further comprising:  
receiving, from the CPU interface, in response to the request to approve the association between the one of the network ports and the source MAC address, an approval of the association between the one of the network ports and the source MAC address; and  
clearing the approval flag for the entry.

79. The computer program of claim 77, further comprising:  
receiving, from the CPU interface, in response to the request to approve the  
association between the one of the network ports and the source MAC address, a disapproval  
5 of the association between the one of the network ports and the source MAC address; and  
deleting the entry.

80. The computer program of claim 74, further comprising:  
receiving, from the CPU interface, in response to the request to approve the  
10 association between the one of the network ports and the source MAC address, an approval  
of the association between the one of the network ports and the source MAC address; and  
approving the unapproved association between the one of the network ports and the  
source MAC address.

81. The computer program of claim 74, further comprising:  
receiving, from the CPU interface, in response to the request to approve the  
association between the one of the network ports and the source MAC address, a disapproval  
15 of the association between the one of the network ports and the source MAC address; and  
deleting the unapproved association between the one of the network ports and the  
20 source MAC address.

82. The computer program of claim 66, wherein the packet further comprises a  
destination MAC address, further comprising:  
processing the packet according to the destination MAC address when an association  
25 between the destination MAC address and a further one of the network ports exists and the  
association between the destination MAC address and the further one of the network ports  
has been approved; and

processing the packet without regard to the destination MAC address when no  
association between the destination MAC address and any of the network ports exists; and

30 processing the packet without regard to the destination MAC address when the  
association between the destination MAC address and the further one of the network ports



exists but the association between the destination MAC address and the further one of the network ports has not been approved.

5           83.     The computer program of claim 82, wherein processing the packet according to the destination MAC address comprises:  
              transmitting the packet from the further one of the network ports.

              84.     The computer program of claim 82, wherein processing the packet without  
10           regard to the destination MAC address comprises:  
              transmitting the packet from all of the network ports but the one of the network ports.